



## Identifying ITS Opportunities for the HA Location Positioning Newsletter: September 2009

### ■ ITS RADAR INTERNATIONAL PROJECT

This project is providing intelligence for the Highways Agency on ITS developments in Europe and around the world. It is carried out by TRL and AECOM on behalf of the HA. The project summarises key information for decision makers and practitioners on activities related to Intelligent Transport Systems (ITS). The project covers specific areas of key interest to the HA.

Regular newsletters are being produced, covering information which is in the public domain. For more information about the project and the services provided, the web site can be reached at: [www.highways.gov.uk/itsradar](http://www.highways.gov.uk/itsradar).

To contact us and let us know what you would like this project to deliver please email us at: [ITSRadarInternational@trl.co.uk](mailto:ITSRadarInternational@trl.co.uk)

### ■ ABOUT LOCATION POSITIONING

This newsletter covers key developments in positioning information relevant to ITS, such as GNSS (Global Navigation Satellite Systems), the Global Positioning System (GPS) and Geographical Information Systems (GIS).

The Galileo Programme is a joint initiative of the European Commission (EC) and the European Space Agency (ESA) to provide Europe with its own independent global civilian controlled satellite navigation system. This is a particular area of focus in ITS Radar International news on Location Positioning.

The Galileo system will allow users to pinpoint their location at any time to a high degree of accuracy, and will ensure Europe's competitiveness in a global market in satellite navigation products and services.

When fully deployed, Galileo will consist of a constellation of 30 satellites in 3 orbits offering unprecedented accuracy and reliability of positioning. This allows for a range of many applications, products and services to be developed for use in transport, telecommunications, fisheries and agriculture, civil protection, building, construction etc. Galileo was due to go live in 2008 but it is now predicted to be in operation by 2013.

## ■ MEETINGS

### **DGON/ITE: 2009 Symposium Gyro Technology**

Source: [RIN](#)

This symposium will be held at the University of Karlsruhe in Germany over 22 to 23 September 2009.

The event is organised by the Institute of Systems Optimisation (ITE) of the University of Karlsruhe in cooperation with the German Institute of Navigation (DGON). It will disseminate recent progress and latest developments in inertial technologies and their applications.

Modern navigation systems increasingly rely on a variety of data sources in order to improve their accuracy. Gyro technology could be used in conjunction with GNSS-based navigation systems to provide additional data input regarding the direction of travel when a GNSS signal is not available.

**ITS Radar International will monitor the outcome of the symposium**

### **International Loran Conference 2009**

Source: [RIN](#)

The conference will be held in South Portland, ME, USA over 13 to 15 October 2009.

Topics covered during the conference will include:

- Loran (LONg Range Aids to Navigation) Specifications, and Standards
- GNSS (Global Navigation Satellite Systems) Interference and Loran as a Back-up
- Loran around the world
- eLoran System Architecture and Transmitter Station
- Technologies
- eLoran Novel Applications
- Calls for Proposals

More information regarding the event can be found here: [www.loran.org](http://www.loran.org)

eLoran was recently recommended by two US Senate Committees as the most suitable and cost efficient back up to GPS in the US, see a previous [ITS Radar International article](#).

**ITS Radar International will continue to monitor Loran**

## ■ HOT TOPICS

### **Source of technical problems for new GPS satellite identified**

Source: [GPS World](#)

The GPS IIR-20(M) satellite has been having some technical difficulties since it was launched into orbit in March 2009. The problem, as reported in this previous [ITS Radar International article](#), was with unusually large pseudo-range errors being transmitted on the L1 and L2 frequencies.

Up until now the source of these errors was not understood. It is now believed that the cause of the errors broadcast by the newest GPS satellite can be attributed to the way in which the L5 signal demonstration payload was added to the satellite. Signal leakage between the two input ports of the antenna coupler network for the satellite's array of 12 helical antenna elements, reflected from the L5 filter and then transmitted, is creating a second signal with a delay of approximately 30 nanoseconds, and the appearance of a multipath component.

The GPS Wing of the United States Air Force (USAF) is currently working on a possible adjustment to the signal-in-space to minimise the effect of the problem on the GPS-signal receivers on Earth.

The GPS Wing is interested in hearing from manufacturers and the user community concerning the different impacts of GPS IIR-20(M) satellite's signals on the wide range products and applications in operation, before reaching a final decision on what to do with the satellite prior to setting its status to healthy.

### **ITS Radar International will continue to monitor GPS developments**

#### **The last GPS IIR(M) satellite was successfully launched**

Source: [GPS World](#)

GPS IIR-21(M), the 8<sup>th</sup> and last of the modernised IIR-M series of GPS satellites and the last in the GPS II series, was successfully launched on 17<sup>th</sup> August 2009 from Cape Canaveral, Florida.

The GPS constellation now consists of 30 satellites, eight of which are the modernised GPS IIR-M. The Block IIR-M series includes features that enhance operations and navigation signal performance for military and civilian GPS users around the globe, specifically a modernised antenna panel that provides increased signal power to receivers on the ground, two new military signals for improved accuracy, enhanced encryption and anti-jamming capabilities, and a second civil signal, providing users with an open access signal on a different frequency.

A further 12 Block-IIIF (follow on) satellites are scheduled to be launched into orbit between 2009 and 2012. That will be the last group of satellites planned to be launched until 2014, when the first of the next generation of GPS satellites, known as GPS III-A, are scheduled for launch. The next generation of satellites will offer improved position, navigation and timing services for users worldwide. The improvements will also include a new international civilian signal (L1C). However, there are some concerns regarding whether the GPS constellation will be able to maintain the desired level of service up until 2014, as reported in a previous [ITS Radar International article](#).

The GPS IIR-21(M) satellite is expected to be set to a "healthy" status in September 2009.

### **ITS Radar International will continue to monitor GPS II**

## **U.S. report challenges Galileo to fulfil level-field commitments**

Source: [GPS World](#)

The US Trade Representative (USTR) has published a report that highlights the apparent concerns over the US equipment industry access to the Galileo programme and markets. In particular three concerns were highlighted:

- Lack of information on how to secure licenses to sell products and/or protect intellectual property rights derived from Galileo Open Service documentation
- Unequal access to Galileo Open Service signal test equipment
- Lack of information regarding the three other Galileo Position, Navigation and Timing (PNT) services.

The USTR “urges the European Commission to take the necessary steps to ensure that the licensing framework is implemented as soon as possible, to allow industry to be prepared to take advantage of the Galileo Open Service”.

The EC maintains that it “continues to honour its commitment to provide commercial licenses on a non-discriminatory basis to interested parties worldwide”, and that any comparison of individual EC or US satellite navigation policies must take due account of the differences in the respective systems’ stages of development and their origins.

The report published by USTR can be downloaded in full from the [Space Commerce web site](#).

## **ITS Radar International will continue to monitor developments**

### **EGNOS nearing safety-of-life clearance**

Source: [GPS World](#)

The European Geostationary Navigation Overlay Service (EGNOS) is being prepared for safety-of-life operations scheduled for 2010. The system is currently in a stage of being setup for the introduction of a new satellite, Inmarsat-4 F2, which is expected to replace Inmarsat-3 F5. The swap over was delayed due to the new Inmarsat-4 F2 payload being different from the previous version, and as a result some upgrades to the up-link stations, including the corresponding compatibility tests, were necessary. The acceptance process of the new satellite is not expected to be completed before end of 2009.

## **ITS Radar International will continue to report EGNOS developments**

### **Two new augmentation services for GLONASS**

Source: [Inside GNSS](#)

Russia is planning to launch two augmentation services for GLONASS (GLOBAL NAVIGATION Satellite System). The first is a space-based augmentation system (SBAS) which will establish first ground monitoring stations outside Russian territory. The network of GLONASS monitoring and measuring stations is expected to be expanded to include sites in Australia, Cuba and South America. These monitoring stations are required in order to improve the integrity, accuracy and reliability of the system.

The other augmentation system is the System of Differential Correction and Monitoring (SDCM) covering the Russian Federation. The system represents an SBAS counterpart to the GPS Wide Area Augmentation System (WAAS) and the European Geostationary Navigation Overlay Service (EGNOS).

Similar to EGNOS, the SDCM would perform integrity monitoring of both GPS and GLONASS satellites as well as provide differential corrections and analyses of GLONASS system performance.

Furthermore, additional signals at L1 and L5 frequencies are expected to be added to the operational GLONASS-K spacecraft, expected to be launched later this year. The signals at L1 and L5 will make GLONASS more compatible and interoperable with other GNSS systems than the current frequency division multiple access (FDMA) signals at the upper L1 frequencies.

By the end of 2010, GLONASS is expected to be at its Full Operational Capability (FOC) with the constellation consisting of 24 operational satellites. With continuing modernisation of the system, Russia expects that by 2012 GLONASS will have a 0.7-meter pseudo range error (compared to 1.8 meters at the end of 2008), a system time steered within 6 nanoseconds of coordinated universal time (UTC), and 1.4-metre stand-alone horizontal positioning accuracy (currently 5 metres).

### **ITS Radar International will continue to report GLONASS developments**

#### **China updates Compass signal plan**

Source: [Inside GNSS](#)

At a recent workshop of the International Committee on GNSS (ICG) Working Group A, China revealed their new plan to move the signal modulation for Compass almost entirely into the binary offset carrier (BOC) family.

China's National Administration of GNSS and Applications (CNAGA) is taking steps to ensure interoperability between its Compass system and other GNSS systems such as Galileo and GPS. At the same time, Yuanxi Yang from CNAGA acknowledged that spectral separation between each system's Authorised Service signals and other system's Open Service signals "would be beneficial for all GNSS systems and users," adding that overlapping of authorised service signals and frequencies "is unavoidable."

China has not yet published an Interface Control Document (ICD) for Compass, although Yang did emphasise the need to publicise the signal-in-space ICDs as well as steering GNSS geodetic reference systems and time scales to a common international standard. He also noted that it was important to document civil performance commitments to inform users of minimum level of service for a fully operational GNSS system.

### **ITS Radar International will continue to monitor Compass developments**

## ■ PROJECTS

### **GINA developments**

Source: [GPS World](#) and [GINA](#)

The GINA (GNSS for INnovative road Applications) project aims to assess the suitability of using GNSS in Road User Charging (RUC) applications and determine the benefits that this may offer.

So far the project team, consisting of 12 European-based companies, has investigated the current use of GNSS for Road User Charging (RUC) and Value Added Services (VAS) and started work on defining users' requirements. The next milestone for the project would be commencing of the trials that would aim to demonstrate the benefits of European Geostationary Navigation Overlay Service (EGNOS) for transportation and Road Pricing applications.

During the trials and demonstrations stage, led by TRL, GINA will aim to show that using EGNOS, an acceptably low level of overcharging can be guaranteed. Furthermore, the trials are being designed based around the requirements of the Dutch ABvM (Anders Betalen voor Mobiliteit) Road Pricing scheme. Results of the GINA project will feed into the development of the upcoming ABvM system. The large scale trials are scheduled to start later in 2009.

### **ITS Radar International will continue to monitor GINA**

## ■ RECENT PUBLICATIONS

No new publications

## ■ GLOSSARY

ABvM	The Dutch (Anders Betalen voor Mobiliteit) Road Pricing project
BOC	Binary Offset Carrier signal
CNAGA	China's National Administration of GNSS and Applications
DGON	German Institute of Navigation
EC	European Commission
EGNOS	European Geostationary Navigation Overlay Service
eLORAN	enhanced LOnG Range Aid to Navigation
GINA	GNSS for INnovative road Applications
GLONASS	Russia's GLObal NAvigation Satellite System
GNSS	Global Navigation Satellite Systems
GPS	Global Positioning System
GPS II R(M)	Modernised block II R GPS satellites, developed by Lockheed Martin
GPS IIF	Follow on block II GPS satellites, last block II satellites to be deployed before the introduction of next generation GPS satellites - GPSIII
ICD	Interface Control Document for GNSS

ICG	International Committee on GNSS
ITE	Institute of Systems Optimisation of the University of Karlsruhe, Germany
ITS	(Intelligent Transport Systems): "The integration of information and communications technology with transport infrastructure, vehicles and users" [ERTICO]
LORAN	Long Range Aid to Navigation
LORAN-C	Long Range Aid to Navigation before it was upgraded to eLORAN
PNT	[GNSS] Position, Navigation and Timing services
RUC	Road User Charging
SBAS	GLONASS Space Based Augmentation System
SDCM	SBAS System of Differential Correction and Monitoring covering the Russian Federation
USAF	The United States Air Force
USTR	US Trade Representative
VAS	Value Added Services